Allegheny County Health Department

Bureau of Environmental Quality
301-39th Street
Pittsburgh, PA 15201-1891

Telephone: 412-578-8134

August 4, 1995

Mr. William C. Smith, Esquire
Region III
US Environmental Protection Agency
841 Chestnut Building
Philadelphia, PA 19107

Dear Bill:

Enclosed is a copy of the attendance sheet for yesterday's meeting with GASP on the USX Clairton quench water sampling program.

Also enclosed is a copy of USX's report, entitled Estimated Cost of Treatment for Coke Quench Waters (August, 1995), that was distributed to GASP at the meeting.

Please contact me if you have any questions or feel that we should further discuss this matter.

Very truly yours,

Charley

Charles J. Goetz
Assistant County Solicitor

CJG:jcp

Enclosures

25-CS-1194

mtg with GASP on Aug. 3, 1995
Re Quench Water Sampling Program at USX Clairton

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U.S. Steel Group

A Division of USX Corporation
Clairton Works
Clairton Pennsylvania

Estimated Cost of Treatment for Coke Quench Waters

August 1995

AUG-03-95 THU 10:38 CHESTER CLAIRTON FAX NO. 4122331011 P. 02

US Steel Clairton Works
Estimated Cost for Treatment of Coke Quench Waters

Executive Summary

Chester Environmental has developed a preliminary cost estimate for the treatment of once-thru coke quench wastewaters. Installation of a treatment system would be financially unreasonable based on the quantities removed and the cost of treatment, as determined by the cost analysis presented in this report. Furthermore, the benefits of such a treatment system would be minimal, given that the concentration of contaminants in the quench water is very low.

The total cost of the treatment system is prohibitive, based on a comparison to costs of RACT. The costs of RACT for particulates is $2,500 per ton of pollutant. The wastewater treatment system discussed in this report would result in a reduction of approximately 1.7 tons per year of pollutants. The annual cost for a $23.5 million treatment system for a 10 year life at 7 percent annual interest rate is $3.35 million plus $0.8 million annual operating cost for a total annual cost of $4.15 million per year. This amounts to $2,400,000 per ton of pollutants removed, which is nearly 1,000 times greater than RACT.

I. Introduction

Currently, coke quench waters are recycled through a quench sump, where make-up water is added to replace water lost to evaporation and to the coke product. There is no discharge from the existing system. The "proposed" wastewater treatment system would be designed to treat the entire volume of quench water to achieve water quality standards for discharge to the Monongahela River, on a once-thru basis (with no recycle). The cost estimate includes the cost of a collection system to transfer the wastewater to the wastewater centralized treatment system. The cost for upgrading the water supply to the quench towers is also included because the existing water supply could not provide the required service water flow to the quench towers if the return quench waters were directed to treament. For the purposes of cost estimating, the site of the Coke Quench Treatment Plant would be west of the existing Contaminated Wastewater Treatment Plant (former site of 16, 17 and 18 coke batteries).

II. Design Flow Rates and Wastewater Characteristics

A simplified flow diagram of the existing coke quench system is shown in Figure 1. Approximately 1,000 gallons of water is applied per ton of coke. Of this 1,000 gallons, 827 gallons returns to the quench sump, 165 gallons is evaporated and 8 gallons remains with the coke product. At the current production rate of approximately 13,000 tons per day and 827 gallons of wastewater per ton, the design flow for the wastewater treatment system would be 10.8 MGD, (approximately 7,500 gpm). The peak hourly design flow is assumed to be 11,250 gpm, which is approximately 1.5 times the average flow rate.

The characteristics of the quench wastewater are based on analytical data collected for the "Allegheny County Special Quench Sump Sampling Program". The raw analytical data is included as Appendix A. The treatment system would be designed to achieve water quality standards, as listed in Chapters 16 and 93 of the Pennsylvania regulations prior to discharge. A summary of the quench wastewater characteristics versus the expected Pennsylvania water quality limits is presented in Table 1.

As indicated in Table 1, the parameters of concern for the wastewater treatment system include the following: pH, Arsenic, Lead, Benzene and Benzo(a)Pyrene (BAP). The human health criteria for BAP is below the method detection limit, which is 0.023 ug/L using the 610-HPLC Method. Therefore, BAP must be treated to non-detectable levels. The required percentage removal rates for each of the above parameters is as follows: Arsenic- 50%, Lead- 54%, Benzene- 50% and BAP- 99.9%.

III. Quench Wastewater Treatment System

The wastewater system would have to be designed to treat quench wastewaters that contain very small quantities of contaminants. Arsenic and lead are present at approximately 100 ug/l and must be treated to 50 ug/L. Benzene is present at levels of 1 to 2 ug/L and must be treated to less than 1 ug/L and BAP is present at 1 to 3 ug/L and must be treated to less than 0.023 ug/L. Both the small amounts of contaminants present in the feed and the extremely low levels required in the effluent impose design constraints on a wastewater treatment system. For example, steam stripping would be a plausible treatment option for benzene, if benzene were present at signifigant quantities in the feed. However, since the feed is so dilute, biological treatment would be the recommended treatment alternative. Granular activated carbon adsorption would be necessary to ensure removal of benzene and BAP to the extremely low limits.

The treatment process would include the following unit processes: equalization, metals precipitation, fixed film biological treatment and granular activated carbon adsorption. Sludge from the metals precipitation and the biofilter backwash would be dewatered and then disposed offsite or recycled to coal. A discussion of the design criteria for each unit treatment process is presented below: Figure 2 is a flow diagram of the Quench Water Treatment Plant.

A. Equalization
Flow equalization would be necessary to provide a relatively constant flow rate. The 1 million gallon Equalization Tank would be designed to handle the peak flow for approximately 4.5 hours, while feeding the treatment process at the average flow rate of 7,500 gpm.

B. Metals Precipitation
Ferric chloride and lime would be added for iron coprecipitation of metals, including arsenic and lead. In this process, trace elements are sorbed onto and trapped within precipitates of iron oxyhydrides. The process consists of a chemical reaction tank, a flocculation tank, and a sedimentaion tank.

B.1 Reaction Tank
Ferric chloride would be added to the Reaction Tank at an estimated dosage rate of 15 mg/L of iron. Lime and polymer would also be added as needed. The Reaction Tank would be equipped with an agitator for mixing and it would have a nominal hydraulic retention time (HRT) of approximately 30 minutes at average flow.

B.2 Flocculation Tank
The Flocculation Tank would be designed for an HRT of approximately 20 minutes at the average flow rate. The tank would be equipped with flocculators to enhance particle growth prior to sedimentation.

B.3 Pretreatment Clarifiers
Wastewater would flow from the Flocculation Tank through a distribution trough to three 90 foot diameter pretreatment clarifiers. The clarifiers would also receive backwash from the carbon columns and biofilters. Each clarifier would be sized based on a surface overflow rate of 0.5 gpm/ft2.

C. Biological Treatment
C.1 Filter Feed Tank
Clarified effluent from the metals precipitation process would flow to a Filter Feed Tank which would serve as a reservoir for the Filter Feed Pumps. The purpose of the Filter Feed Pumps would be to provide sufficient hydraulic head to transfer water through the Downflow Biofilters and the Carbon Columns. At the average flow rate, three filter feed pumps, rated

at 2,500 gpm each, would be online. Two additional 2,500 gpm pumps would be installed to handle peak flows.

C.2 Downflow Biofilters

Four fixed-film biofilters would be installed for removal of organics, in particular benzene. Because of the dilute nature of quench waters, nutrients must be supplied to the biofilters to maintain biological growth on the media. The size of the filters are based on a design loading rate of 0.8 gpm/ft2. The Downflow Biofilter reactors would be approximately 51 foot long by 9.5 foot wide by 18 foot deep made of concrete. The reactor internals include the filter media, underdrain system, influent troughs, effluent/backwash troughs and internal trough distribution system. The media in the fixed-film reactors would be several layers of differnt sized gravel and a layer of sand. Auxilliary equipment required for the Downflow Biofilters includes the following: air blowers, backwash pumps, air compressors, air dryers, air filters, pneumatic control valves, process instrumentation, concrete foundations and a Programmable Logic Controller.

As solids get trapped in the filter media, the flow becomes restricted and the filter must be backwashed. Normally, three Downflow Biofilters would be in service and one would be backwashing. The backwash from the filters would be directed to the pretreatment clarifiers.

D. Granular Activated Carbon Adsorption

D.1 Carbon Columns

The carbon columns were sized for removal of BAP. At a design loading rate of 4.0 gpm/ft2, two trains of twenty-four (24) carbon columns, 10 feet in diameter, are required. The columns would be arranged 24 columns in parallel and each carbon column in the first train would have a second carbon column in series. When breakthrough occurs in the first column, the second column would remain online until the carbon in the first column is replaced. The hydraulic residence time within the carbon would be approximately 30 minutes. Based on a removal rate of 0.36 pounds per day of BAP, the carbon consumption is estimated at approximately 10 pounds per day.

D.2 Effluent Monitoring

The effluent from the Quench Water Treatment Plant would be monitored at the Effluent Tank for the parameters of concern listed in Table 1. The effluent tank would also serve as a reservoir for the backwash pumps.

IV. Collection System

The collection system consists of pumps located at each quench sump and piping from the pumps to the Quench Water Treatment Plant. A simplified schematic of the wastewater collection system is included in Figure 3. The estimated cost of the collection system does not include costs for overhead pipe racks because it is assumed that the pipes can be hung from existing pipe racks.

V. Water Supply System Upgrade

The existing water supply system to the quench tower clear wells is designed to provide make-up water to replace the water that evaporates plus the water that is lost to the coke product after quenching. If the return quench water is directed to a treatment system, then the water supply system would have to be upgraded to provide the total flow to the clear well. The capacity of the intake pumps are believed to be adequate to handle the additionaly flow requirements for a once-thru system. However, the piping network would have to be upgraded.

The piping from the main water supply lines to the quench towers is 8-inch carbon steel pipe. An additional 12-inch pipeline would have to be installed from the main supply line to Quench Towers 1, 3, 5 and 7 to provide the required flow capacity of 1,700 gpm. The required flow capacity to the "B" Battery is 4,000 gpm. A 16-inch pipe would have to be installed in parallel with the existing supply line to provide sufficient flow for quenching. The total linear feet of 8-inch line is estimated to be approximately 3,000 feet and approximately 500 feet of 16-inch pipe would have to be installed to upgrade the "B" Battery water supply.

VI. Estimated Costs

The estimated capital cost of the Quench Water Treatment Plant is $21.3 million. The estimated capital cost of the wastewater collection system is $1.5 million and the cost of the water supply system upgrade is estimated at $ 0.7 million for a total of $23.5 million. These estimates include a 25 percent contingency, monies included to cover items that were not specifically estimated. The costs were developed based on estimates from other treatment plants, the Means Index and Richardson's Estimating Standards. Tables 2, 3 and 4 show the cost breakdown of the wastewater treatment plant, collection system and revisions to the water supply system.

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Operating and maintenance costs for the treatment and collection system, shown in Table 5, are estimated to be approximately $800,000 per year.

The total cost of the treatment system is prohibitive, based on a comparison to costs of RACT. The costs of RACT for particulates is $2,500 per ton of pollutant. The wastewater treatment system discussed in this report would result in a reduction of approximately 1.7 tons per year of pollutants. The annual cost for a $23.5 million treatment system for a 10 year life at 7 percent annual interest rate is $3.35 million plus $0.8 million annual operating cost for a total annual cost of $4.15 million per year. This amounts to $2,400,000 per ton of pollutants removed, which is nearly 1,000 times greater than RACT.

TS: clrtn2

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Table 1: Comparison of Quench Wastewater Characteristics
to Water Quality Standards

Parameter	Quench Wastewater Characteristics Average (ug/L)	Quench Wastewater Characteristics Maximum (ug/L)	Water Quality Standards (ug/L)
Alkalinity	32 mg/L		> 20 (mg/L)
pH	8.7 S.U.	[illegible]	6 - 9 S.U.
Phenol	98	288	300
Total Dissolved Solids	360,000	438,000	500,000 ave.; 700,000 max.
Arsenic	[illegible]	[illegible]	50
Lead	20	[illegible]	50
Mercury	< 1.0	< 2.0	0.144
Benzene	[illegible]	[illegible]	1
Naphthalene	2.9	5.97	10
Benzo(a)Pyrene (BAP)	[illegible]	[illegible]	0.003
Free Cyanide	5.0	6.0	700

All units ug/L except where noted otherwise.

Shaded areas indicate concentrations that exceed water quality human health criteria.

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ts: costest4

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Table 2: Opinion of Probable Costs
Treatment System for Coke Quench Waters

Equipment Description	Qty	Unit Cost	Material Cost	Installed Cost
Equalization Tank 1 MG Prestress Conc.	1 ea	530,000	-	530,000
Feed Pumps 2,500 gpm horiz. centrifugal	5 ea	10,000	50,000	75,000
Reaction Tank with Mixer 225,000 gal steel	1 ea	110,000	-	110,000
Flocculation Tank 150,000 gal. Steel	1 ea	100,000	-	100,000
Floc Tank Agitator	1 ea	40,000	40,000	60,000
Pretreatment Clarifiers 90' dia x 10' swd	3 ea	750,000	-	2,250,000
Clarifier Underflow Pumps 200 gpm horiz. centrifugal	3 ea	3,000	9,000	13,500
Sludge Holding Tank 400,000 gal conical bottom	1 ea	400,000	-	400,000
Filter Press Feed Pumps 100 gpm horiz. centrifugal	2 ea	3,000	6,000	9,000
Filter Press 50 cu. ft.	2 ea	120,000	240,000	300,000
Filtrate Sump 25,000 gal concrete	1 ea	16,000	16,000	20,000
Filtrate Sump Pumps 200 gpm submersible	2 ea	4,000	8,000	12,000
Filter Feed Tank 400,000 gal steel	1 ea	200,000	-	200,000
Filter Feed Pumps 2,500 gpm horiz. centrifugal	5 ea	10,000	50,000	75,000
Biofilters 2,000 sf system	1 ls	840,000	-	1,000,000
Carbon Columns 10' dia. with carbon	48 ea	60,000	2,880,000	3,600,000
Effluent Monitoring Tank 50,000 gal Steel	1 ea	55,000	-	55,000
Backwash Pumps 4,000 gpm horiz. centrifugal	2 ea	13,000	26,000	39,000
Ferric Chloride Feed System Tank, Metering Pump, Misc Eq.	1 ls	10,000	10,000	15,000
Dry Lime Feed System Screw Feeder and Misc Eq.	1 ls	50,000	50,000	75,000
Polymer Feed System Tank, Mixer, Pump	1 ls	16,000.	16,000	24,000

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Table 2: Opinion of Probable Costs
Treatment System for Coke Quench Waters

Equipment Description	Qty		Unit Cost	Material Cost	Installed Cost
New Building	1	ls	50,000	-	50,000
Concrete	54,000	sf	8	432,000	432,000
Site Work	1	ls	750,000	-	750,000
	SUBTOTAL I				$10,195,000
	Piping 30%				$3,059,000
	Electrical 25%				$2,549,000
	SUBTOTAL II				$15,803,000
	25% CONTINGENCY				$3,951,000
	ENGINEERING 10%				$1,580,000
	TOTAL				$21,334,000

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ts: costest

USS Clairton Works
Table 3: Opinion of Probable Costs
Collection System for Coke Quench Waters

Equipment Description	Qty	Unit Cost	Material Cost	Installed Cost
16" Carbon Steel Pipe	5,100 lf	140	-	714,000
12" Carbon Steel Pipe	1,350 lf	120	-	162,000
16" Elbows	10 ea	1,100	-	11,000
12" Elbows	10 ea	625	-	6,250
16" Gate Valves	4 ea	6,000	-	24,000
12" Gate Valves	8 ea	2,000	-	16,000
Transfer Pumps 1,000 gpm vertical	15 ea	8,000	120,000	180,000
	SUBTOTAL			$1,113,000
	25% CONTINGENCY			$278,000
	ENGINEERING 10%			$111,000
	TOTAL			$1,500,000

Note: The cost of overhead pipe racks was excluded. It is assumed that existing pipe racks could be used.

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Table 5: Opinion of Probable Costs

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Table 4: Opinion of Probable Costs
Water Supply System Upgrade

Equipment Description	Qty	Unit Cost	Material Cost	Installed Cost
16" Carbon Steel Pipe	750 lf	140	-	105,000
12" Carbon Steel Pipe	3,000 lf	120	-	360,000
16" Elbows	5 ea	1,100	-	5,500
12" Elbows	8 ea	625	-	5,000
16" Gate Valves	2 ea	6,000	-	12,000
12" Gate Valves	8 ea	2,000	-	16,000
SUBTOTAL				$504,000
25% CONTINGENCY				$126,000
ENGINEERING 10%				$50,000
TOTAL				$680,000

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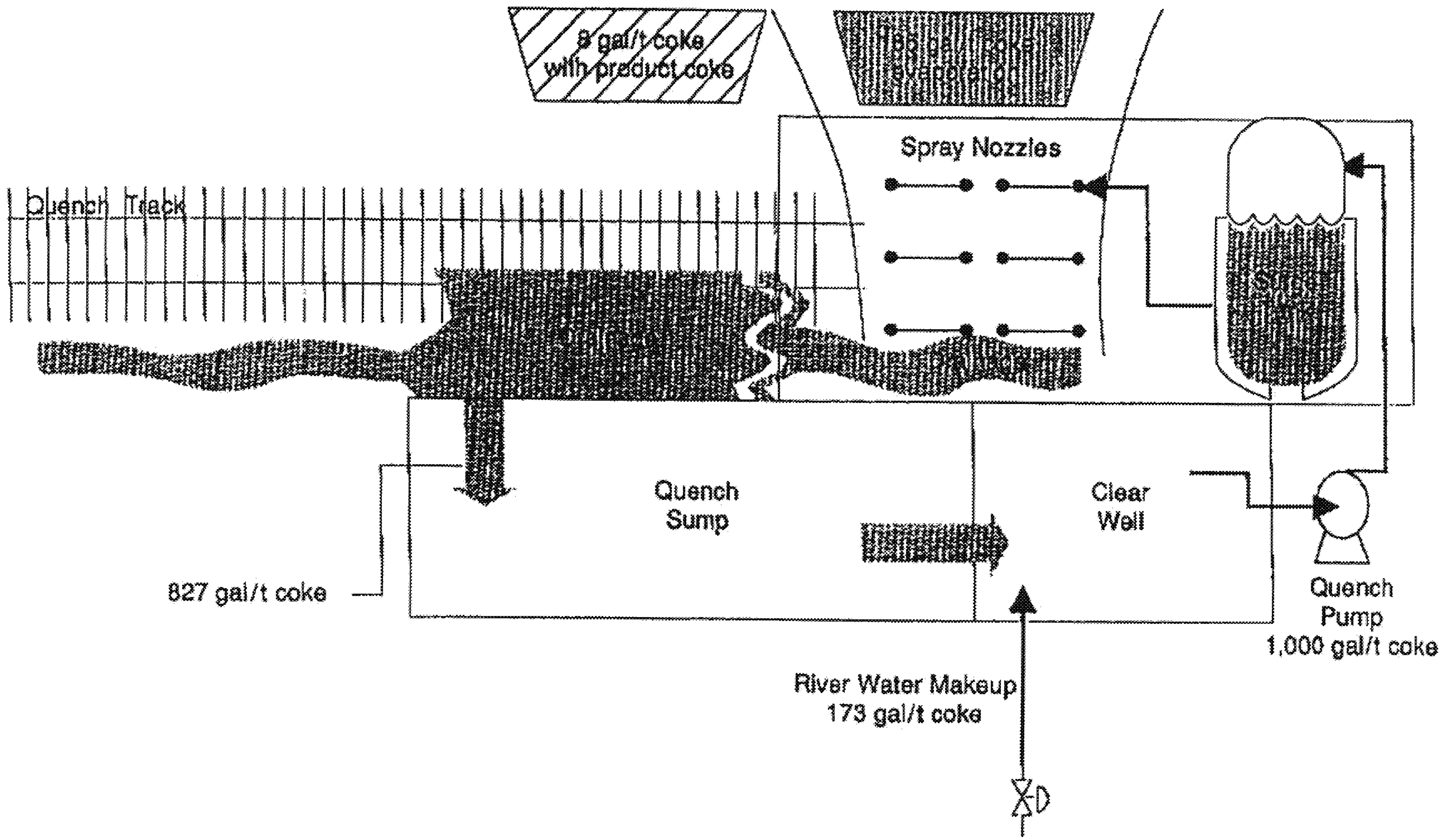

FILE NAME	SCALE	DATE
usaqtss	None	7/18/95
DWG NO.: Figure 1		

US Steel Group
A Unit of USX Corporation
Clairton Works
Quench Tower Simplified Schematic

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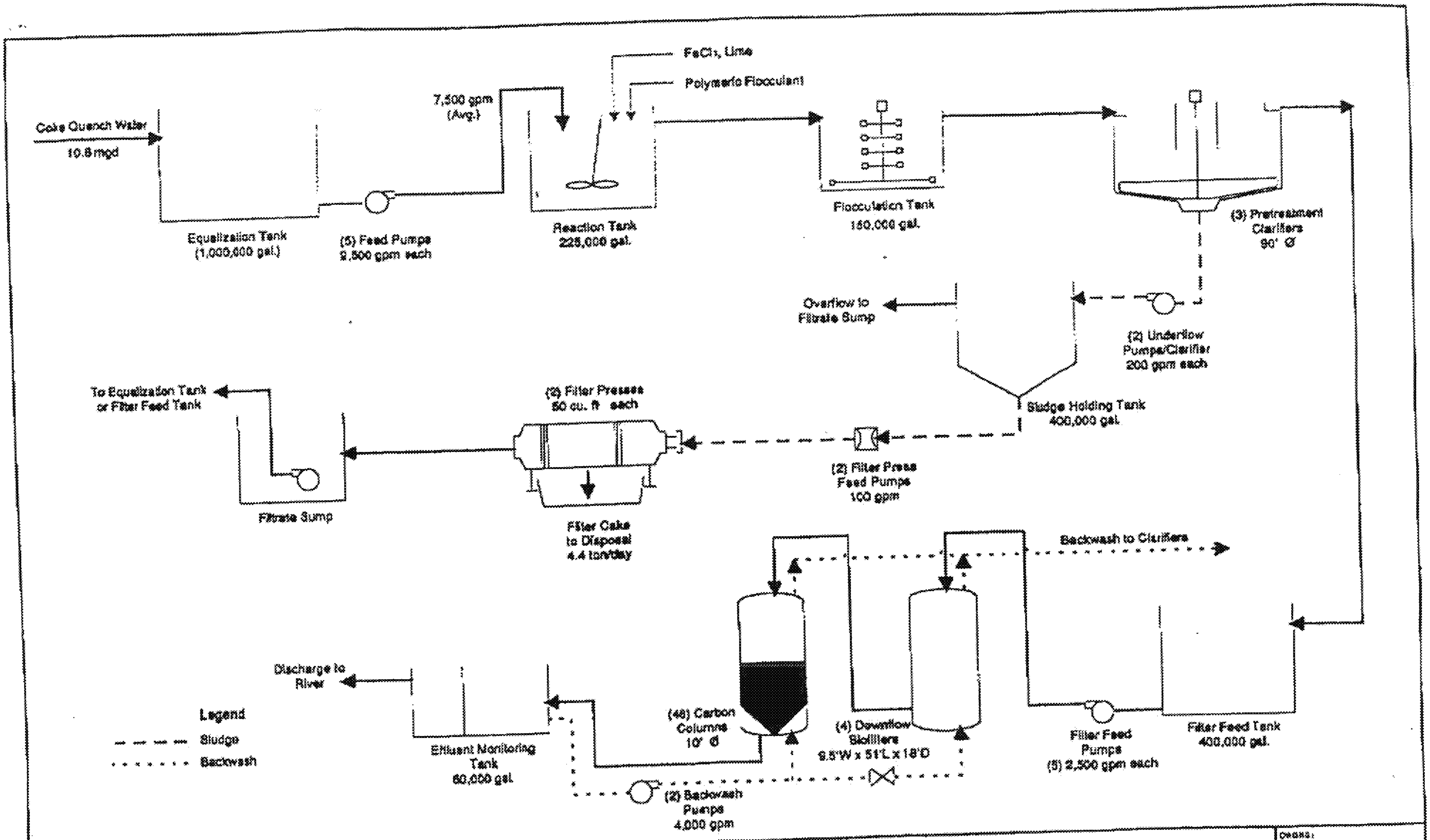
DWN BY:	CHK'D BY:	APPR BY:
JT	TS	



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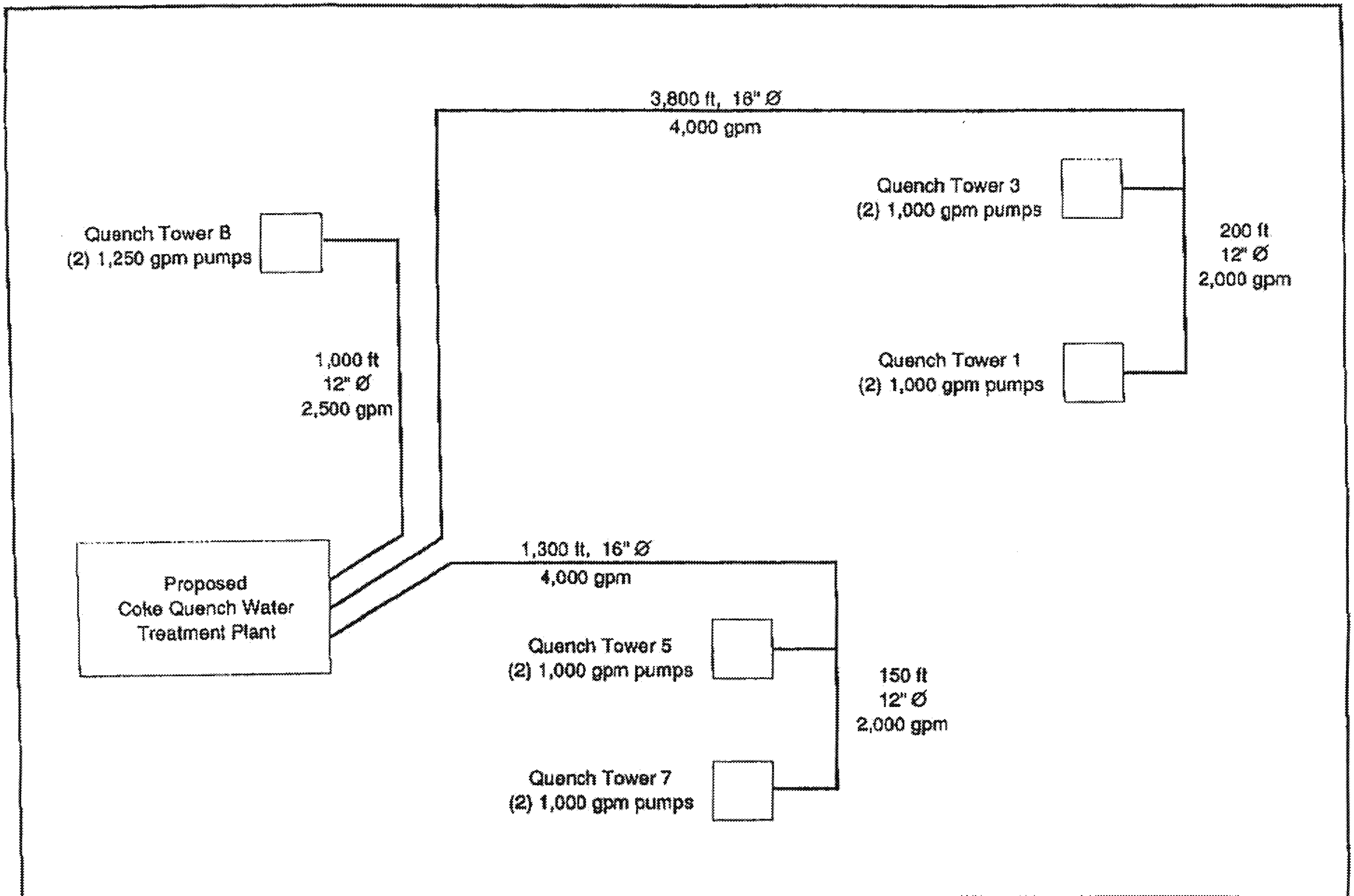
US Steel Group
A Unit of USX Corporation
Clairton Works

Proposed Treatment System for Coke Quench Waters

Figure 2



FILE NAME: usscscqw	SCALE: None	DATE: 7/18/95	US Steel Group A Unit of USX Corporation Clairton Works	CHESTER ENVIRONMENTAL		
DWG NO.: Figure 3			Proposed Collection System for Coke Quench Waters	DWN BY: JT	CHK'D BY: TS	APPR BY:

APPENDIX A

RAW ANALYTICAL DATA - COKE QUENCH WATERS

ALLEGHENY COUNTY SPECIAL QUENCH SUMP SAMPLING PROGRAM

Combined DER and USX Samples

Sample Location		Alkalinity, mg/l	BOD_5, mg/l	NH_3-N, mg/l	pH s.u.	Phenol, ug/l	CN, ug/l	Dissolved Solids, Total mg/l	TPH, mg/l	Total Solids, mg/l	Suspended Solids, Total mg/l	As, ug/l	Pb, ug/l	Hg, ug/l	Benzene, ug/l	Napthalene, ug/l	Phenanthrene, ug/l	benzo(a)pyrene, ug/l	CN, free, gu/l
1-3/7-9	2/3/94	28	3.6	0.29	7.8	64	70.0	376	<0.5	558	182	<100	<25	<1.0	*	*	*	*	2.0
Battery	2/17/94	36	3.5	0.73	8.4	113	73.0	336	0.82	470	134	81.25	<50	<1.0	*	*	*	*	2.0
DER	2/28/94	34	3.0	0.26	9.0	145	75.0	314	<0.5	558	244	54.7	<50	<1.0	ND	0.7	ND	ND	2.0
	4/21/94	28	2.0	0.26	8.1	60	70.0	360	0.65	552	192	67.48	4.94	<1.0	*	*	*	*	*
	5/19/94	38	3.6	0.23	9.0	75	85.0	342	<2.0	390	48	55.33	<4.0	<1.0	ND	ND	ND	ND	*
1-3/7-9	1/27/94	36	4.2	0.36	7.5	120	9.0	390	<0.5	430	91	55.0	<3.0	<.20	<5	<10	<10	0.57	
Battery	2/3/94																		
USX	2/17/94	27	1.0	0.39	7.9	120	5.0	330	0.68	550	140	63.0	5.0	<.20	<5	<10	<10	0.74	
	2/28/94																		
	4/21/94	29	6.0	<0.05	9.1	64.0	<5.0	330	<0.5	420	51	59.0	<3.0	<.20	<5	<10	<10	1.74	
	5/19/94																		
B	2/3/94	32	3.0	0.65	7.8	5.0	155.0	404	<0.5	546	142	<100	<25	<1.0	*	3.0	*	*	18.0
Battery	2/17/94	44	1.5	0.63	8.9	83	108.0	440	<0.5	510	70	58.53	<50	<1.0	*	3.0	*	*	5.0
DER	2/28/94	32	2.4	0.67	8.7	15	155.0	374	<0.5	828	454	73.38	<50	<1.0	ND	1.7	ND	ND	6.0
	4/21/94	30	2.0	0.64	8.3	65	250.0	450	<0.5	514	64	37.56	<4.0	<1.0	*	*	*	*	*
	5/19/94	32	2.0	0.51	8.3	5.0	205.0	344	<2.0	512	168	57.43	4.16	<1.0	ND	ND	ND	ND	*
B	1/27/94	34	3.0	0.69	8.1	240	13.0	440	0.50	490	98	36.0	4.0	<.20	<5	<10	<10	0.88	
Battery	2/3/94																		
USX	2/17/94	36	1.0	0.85	8.9	98.0	7.0	410	<0.5	610	98	37.0	3.5	<.20	<5	11	<10	0.38	
	2/28/94																		
	4/21/94	35	7.0	0.12	9.1	89.0	22.0	420	<0.5	500	57	38.0	<3.0	<.20	<5	<10	<10	2.67	
	5/19/94																		
13-15	2/3/94	28	1.5	0.33	8.9	10	*	340	<0.5	400	60	*	*	<1.0	*	1.3	*	*	*
Battery	2/17/94	38	0.75	0.29	8.9	35	80.0	306	<0.5	352	46	74.17	<50	<1.0	*	1.1	*	*	6.0
DER	2/28/94	24	0.6	0.32	8.6	23	155.0	292	<0.5	364	72	90.38	*	<1.0	ND	0.5	ND	ND	5.0
	4/21/94	48	3.0	0.15	9.9	50	15.0	394	2.7	520	126	50	4.53	<1.0	*	*	*	*	*
	5/19/94	30	1.2	0.31	8.6	83	200.0	318	<2.0	362	44	82.54	<4.0	<1.0	ND	ND	ND	ND	*
13-15	1/27/94	36	3.6	0.42	7.9	24.0	21.0	340	0.50	370	54	43.0	<3.0	<.20	<5	<10	<10	0.13	
Battery	2/3/94																		
USX	2/17/94	31	2.0	0.50	9.2	28.0	5.0	280	0.76	410	58	53.0	3.6	<.20	<5	<10	<10	0.16	
	2/28/94																		
	4/21/94	24	10.0	0.11	10.5	15.0	17.0	380	<0.5	520	92	46.0	<3.0	<.20	<5	<10	<10	1.01	
	5/19/94																		

ALLEGHENY COUNTY SPECIAL QUENCH SUMP SAMPLING PROGRAM

Combined DER and USX Samples

Sample Location		Alkalinity, mg/l	BOD_5, mg/l	NH_3-N, mg/l	pH s.u.	Phenol, ug/l	CN, ug/l	Dissolved Solids, Total mg/l	TPH, mg/l	Total Solids, mg/l	Suspended Solids, Total mg/l	As, ug/l	Pb, ug/l	Hg, ug/l	Benzene, ug/l	Natphalene, ug/l	Phenanthrene, ug/l	benzo(a)pyrene, ug/l	CN, free, ug/l
19-20 Battery DER	2/3/94	38	4.0	0.65	9.2	144	125.0	342	<0.5	554	212	<100	108	<1.0	*	2.3	*	*	3.0
	2/17/94	36	2.5	0.43	8.6	215	110.0	310	<0.5	454	144	73.13	<50	<1.0	1.5	2.7	*	*	1.0
	2/28/94	28	1.2	*	8.7	63	130.0	*	<0.5	*	*	100.7	<50	<1.0	0.7	1.5	ND	ND	6.0
	4/21/94	28	3.5	0.38	9.4	215	300.0	438	0.65	508	70	<4.0	8.55	<1.0	*	*	*	*	*
	5/19/94	38	6.0	0.57	8.9	288	280.0	324	<2.0	498	174	79.73	8.13	<1.0	2.0	5.97	20.5	ND	*
19-20 Battery USX	1/27/94	32	5.4	0.58	7.6	140	<5.0	340	0.74	420	58	45.0	16.0	<.20	<5	<10	<10	0.44	
	2/3/94																		
	2/17/94	31	1.0	0.47	8.8	250	5.0	310	3.40	520	140	52.0	67.0	<.20	<5	<10	<10	0.77	
	2/28/94																		
	4/21/94	26	6.0	<0.05	9.9	200	25.0	390	<0.5	480	72	32.0	22.0	<.20	<5	<10	<10	3.99	
	5/19/94																		
Quench Water Avg.		32.72	3.16	0.44 **	8.7	98.25	95.5 **	360	1.14 **	489.35	117.9	59.09 **	19.95 **		1.4	2.9 **	20.5 **	1.12 **	5.0
Intake Avg.		26.25	1.7 **	0.13 **	6.8	2.0 **	3.0 **	156.33	1.2 **	211.43	46.43	5.72 **	5.15 **						
River Water Intake DER	2/3/94	22	0.8	0.13	6.7	0	1.0	*	<0.5	190	34	<100	<25	<1.0	*	*	*	*	<1.0
	2/17/94	26	1.6	0.14	6.5	0	<1.0	154	<0.5	204	50	5.72	<50	<1.0	*	*	*	*	<1.0
	2/28/94	26	1.2	*	7.0	0	<1.0	*	1.2	*	*	<4.0	<50	<1.0	ND	ND	ND	ND	<1.0
	4/21/94	26	0.8	0.09	6.3	0	<1.0	174	<0.5	204	30	<4.0	<4.0	<1.0	*	*	*	*	*
	5/19/94	26	0.8	0.09	6.3	0	<1.0	160	<0.5	162	2.0	<4.0	<4.0	<1.0	ND	ND	ND	ND	*
River Water Intake USX	1/27/94	34	<1.0	0.25	6.7	12.0	<5.0	180	<0.5	290	130	<5.0	6.6	<.20	<5	<10	<10	<0.02	
	2/3/94																		
	2/17/94	21	2.0	0.07	6.5	<4.0	5.0	120	<0.5	240	66	<5.0	3.7	<.20	<5	<10	<10	<0.02	
	2/28/94																		
	4/21/94	29	5.0	<0.05	8.3	<4.0	<5.0	150	<0.5	190	13	<5.0	<3.0	<.20	<5	<10	<10	<0.02	
	5/19/94																		

*parameter not analyzed

**averages do not include samples for which the parameter analyzed was below detection limits, as indicated by either "<" or "ND".

Blank averages are due to all sample analyses being below detection limits.

U. S. Steel Clairton Works
Quench Sump Sampling Program 1994
Operating Information

	Batteries		1–3	7–9	B	13–15	19–20
	Sump Designation		1	3	B	5	7
Production							
	Previous Day	(NT)	2577	2504	2302	2683	2646
	Sample Day	(NT)	2557	2448	2407	2565	2714
	Average	(NT)	2567	2496	2354	2624	2680
Sump Info.							
	Settling Section Volume (GAL/Daily Ton)	(1)	105	88	204	103	101
	Cleaning Frequency (Per Week)	(2)	3.5	6.3	6.5	3.8	6.9
	Breeze Removed (Trucks/Week)	(2)	18.9	20.3	39.2	17.5	33.6
Coke Characteristics							
	Volatile Matter (%)	(3)	0.63	0.61	0.61	0.55	0.65
	Moisture (%)	(3)	2.95	4.29	4.43	2.78	2.16
	Sulfur (%)	(3)	0.81	0.74	0.58	0.65	0.65
	Ash (%)	(3)	8.63	8.47	7.94	8.18	8.26
Pushing and Travel							
	Pushing Opacticies (sec/push>20%)	(3)	0.8	0.4	N/A	1	1.3
	Travel Opacities (sec/push>10%)	(3)	1.1	0.5	N/A	0.5	1.3

(1) Design volume / (previous and sample day average production)
(2) Long term average
(3) Average of sample day and previous day

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